

# US Air Quality Contributions To GEOSS

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# *Outline*

- GEOS 101:  
Vision, Approach, Organization
- Two early deliverables:  
AIRNow-International & SERVIR-Air
- AQ Community Contributions:  
GEO Architecture Pilot AQ work
- Two upcoming meetings:  
Santa Barbara (July),  
DC GEO Plenary (November)

# *GEOSS: Vision*

GEOSS, the GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS, is envisioned to realize a future where societal decisions and actions “are informed via coordinated, comprehensive, and sustained Earth observations and information.”

GEOSS is to incorporate a wide array of data: *in-situ*, airborne, & space-based observations, with a global domain

GEOSS seeks to provide decision support for nine *Societal Benefit Areas*:

- Disasters
- Energy
- Water
- Agriculture
- Ecosystems
- Health
- Climate
- Weather
- Biodiversity



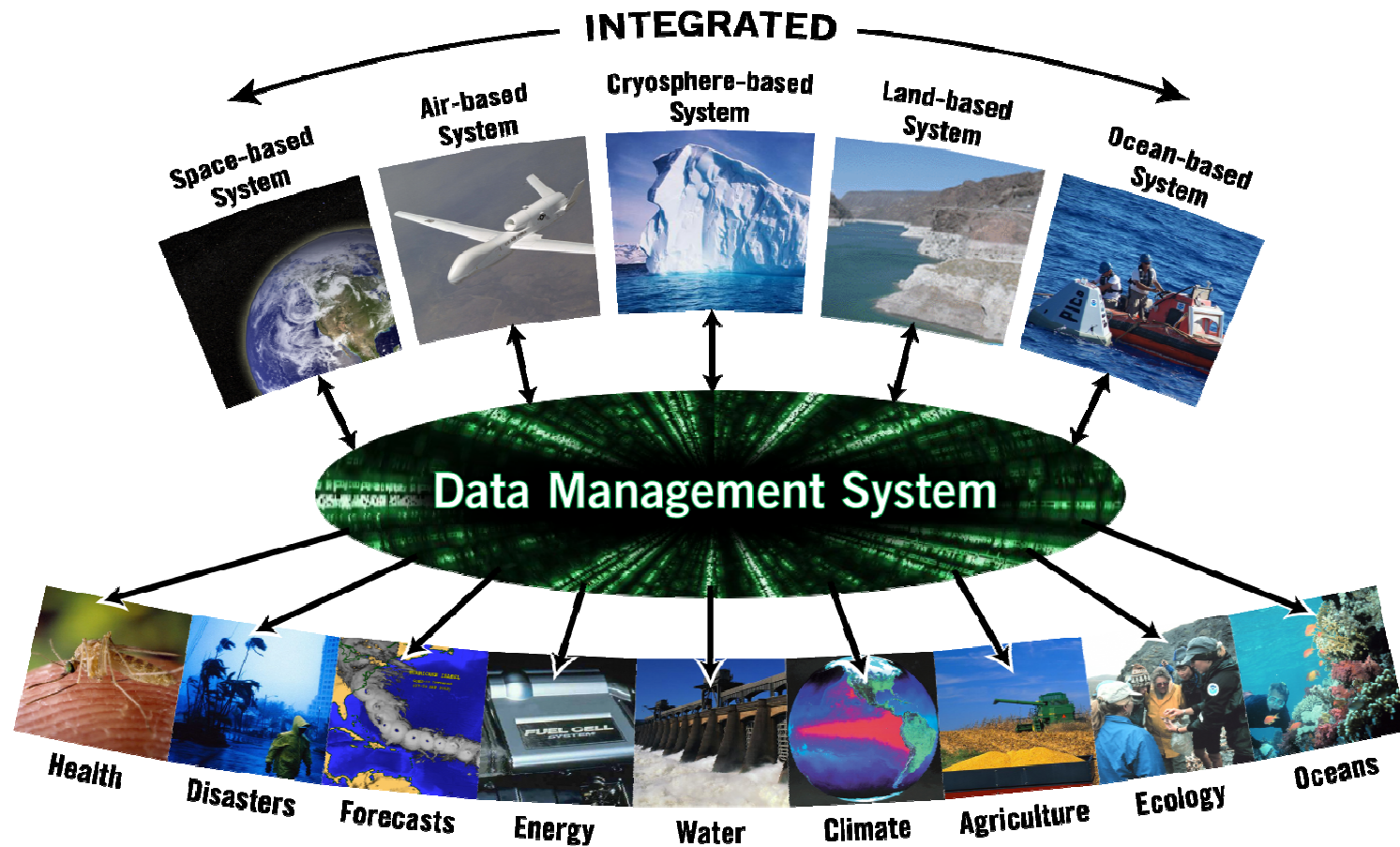
# *GEOSS: Vision*

GEOSS seeks benefit from efficient, open approaches to data and architecture designed to maximize uses of observations:

- facilitate exchange of data at minimal cost
- promote standards
- service-oriented architecture
- address incorporation of observations of various types, models, etc.
- identify gaps, improve coordination

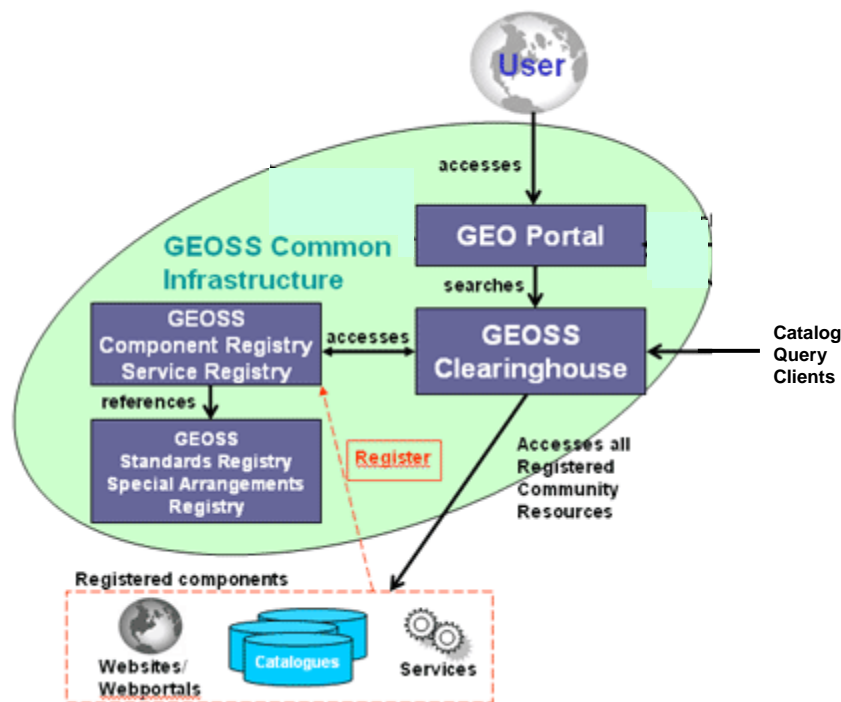


# *From Vision to Reality...*



# *GEOSS: Technical Initiative*

GEOSS is built around a minimal central clearinghouse and other components of a Common Infrastructure. This GCI is not to house data or tools for using data – it is used to enable users to find that data.



GEOSS registries are flexible enough to work with ‘any’ observation, so metadata will be less than needed for many users.

Community catalogs and portals are a response to this need for a richer access point, tuned for a particular user community.

*GEOSS is about decision support.* The GCI won’t provide that. It is set up as a base for service oriented architecture which will in turn improve decision support.

# *GEOSS: Organization*

**International:**  (Group on Earth Observations)

77 member nations + EC; 56 observed int'l organizations

Secretariat at WMO in Geneva; Co-chaired by US, EC, China, S. Africa

**Four Permanent Committees:**

Architecture & Data, Capacity Building,  
Science & Tech, User Interface

**Coordinates / Oversees building of GEOSS:**

- GEOSS Common Infrastructure
- GEOSS Work Plan: ~115 Tasks, including
  - Atmospheric Model Evaluation
  - Aerosol Impacts on Health & Environment
  - Air Quality Observations, Forecasting, & Public Information
  - Global Monitoring of Hg
  - Global Monitoring of POPs

# *GEOSS: Organization*

International:  (Group on Earth Observations)

National:  subcommittee of CENR

- 15 agencies + 3 White House offices
- Coordinates USG response / contributions to GEO / GEOSS
- 5 Working Groups:
  - Architecture & Data Management
  - Strategic Assessment
  - Partnership, Outreach, & Communications
  - Earth Observations Policy & Planning
  - International
- 2005: US Strategic Plan
- 2006: Air Quality Near-Term-Opportunity Plan
  - Integrated Observed-Modeled Air Quality Fields
  - Systems for Utilizing Observations to Improve Air Quality Forecasts
  - Assessments of Key Air Quality Processes
  - Improved National Emissions Inventories
  - Improved International Transport Assessments



# *GEOSS: Organization*

International:  (Group on Earth Observations)

National:  subcommittee of CENR

EPA: EPA GEO organized under EPA Science Council

- Chaired by ORD and OEI
- Focal Points from all Media Offices
- Representatives from Regional Offices

# *EPA's Response to GEOSS*

Beginning in FY06, funding for GEOSS-related activities has been provided through the Advanced Monitoring Initiative (~\$5M/year, most of which has been allocated by EPA GEO)

## **FY 2006-2007: Focus on Pilot Projects**

- 34 funded projects (17 air-related projects)
- Projects to facilitate data availability, fusion, and use for decision support
- Deliverables are just now becoming available

## **FY 2008-2009: Four Thematic Areas**

- Air, Water, Integrated (Land Use), Information Technology
- Air Theme Focused on applications for:
  - Air Quality Forecasting & Public Information
  - Air Quality Model Evaluation
  - Emissions Inventory Development & Analysis

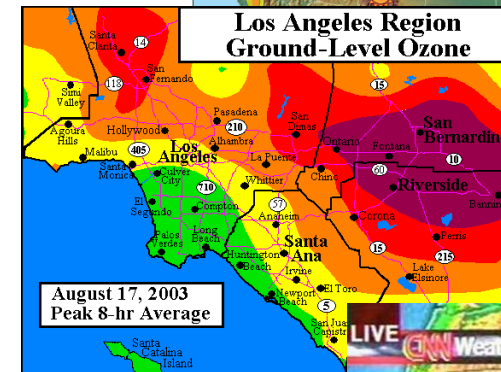
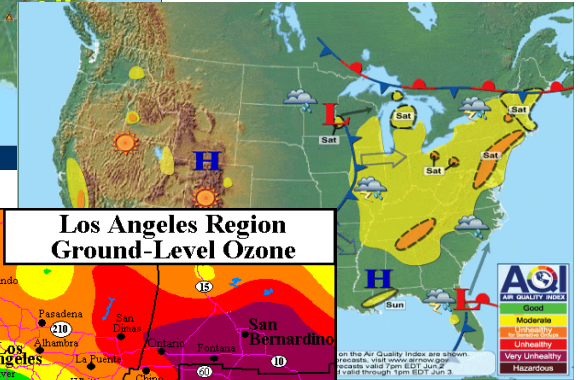
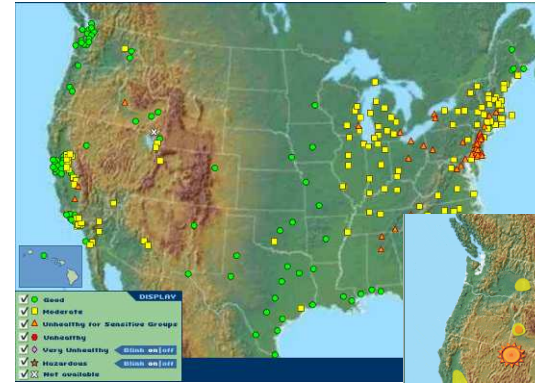
# GEO Summit IV

- USGEO made a concerted effort to provide concrete deliverables to the 4<sup>th</sup> GEO Summit in Cape Town, November 2007
- Air quality was one of 5 themes highlighted by the U.S.
  - EPA: AIRNow-International
  - NASA: SERVIR-Air

# AIRNow Overview

## Inputs from Partners

- Real-time, hourly concentrations for O<sub>3</sub>, PM from **Ambient** Monitors
- Forecasts for 300 cities
- Daily National Outlooks

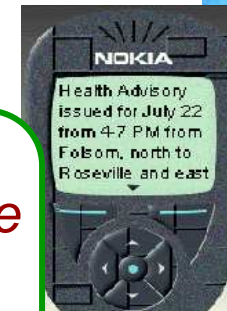


## AIRNow

- Collects AQ data, forecasts (from 120+ partners)
- Checks data
- Converts data to AQI
- Maps data
- Distributes data

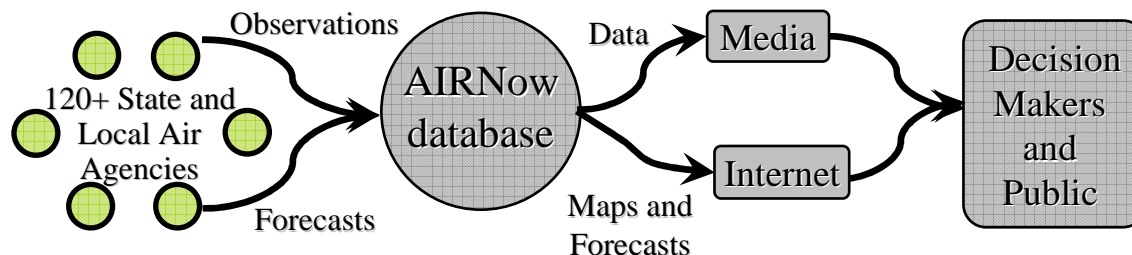
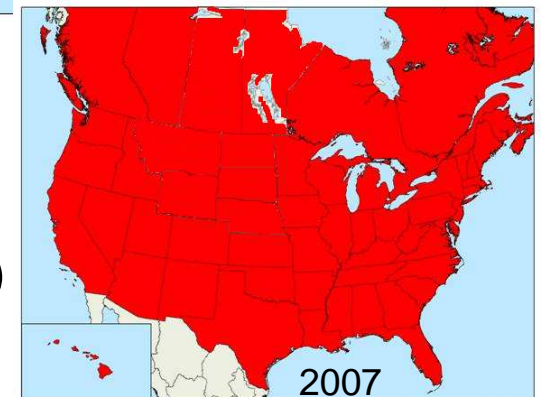
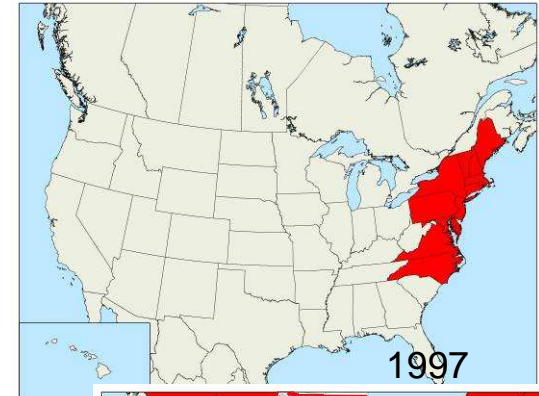
## AIRNow Outputs

- Real-time Maps, Website
- Email, SMS alerts
- Target info / formats for media, health



# AIRNow History & Approach

- Started in 1995 by Maryland
- Since 1997, funded by U.S. EPA, but stakeholder involvement is voluntary
- Broad, diverse stakeholder community
  - Federal, state, provincial, Tribal, and local air agencies (120+)
  - Scientific and health research organizations (15+)
  - Media and public outreach groups (30+)



# AIRNow-International

**Vision:** Provide real-time air quality information, worldwide

**Mission:** Promote protection of air quality by leading & supporting a worldwide community of AQ data sharing

## **Approach:**

- Produce AIRNow 2.0
  - improve software with a focus on standardization, interoperability
  - general goals: portable, inexpensive to use, open source
- Pilot implementation in Shanghai by Fall, 2009
- Planning to implement AIRNow with other partners after successful installation in Shanghai
- ❖ *AIRNow-I is a prominent US deliverable for GEOSS*
- ❖ *A primary motivation for EPA is improving data availability in source regions*

# Co-Benefits from AIRNow-I

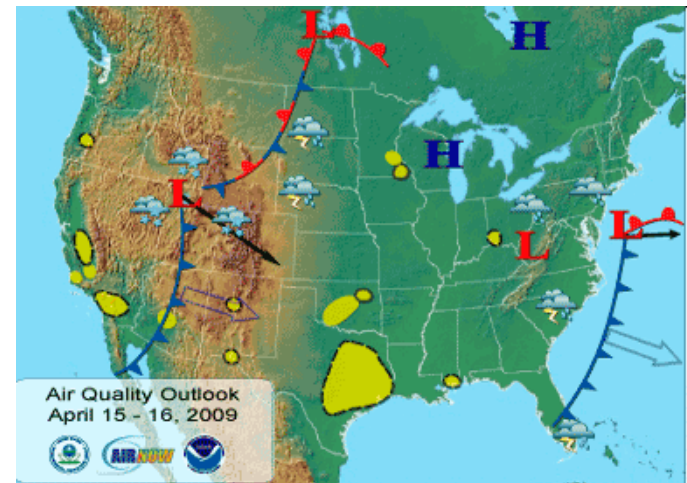
AIRNow 2.0 will benefit EPA's domestic program & others:

- AIRNow 2.0 will be implemented in the US, improving efficiency of AIRNow here

- Software components will be made available to other users:

- Data management software will be made available to local AQ agencies for monitoring network management

- Mapping and information management software (open-source) will be made available to public agencies to support analysis and public information about environmental conditions



Common software, inherent standards, promotion of AQI all will build a foundation for AQ data sharing





# SERVIR: Bringing Satellite Data to Mesoamerica

www.SERVIR.net

**SERVIR**  
THURS, JUNE 28, 2007  
● Español  
● English

**Sistema de Monitoreo y Visualización para Mesoamérica**

**Información Mesoamericana | Mapas en Línea | Apoyo a la Toma de Decisiones | Visualizaciones 3-D**

[Inicio](#)  
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[Descargas](#)  
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[Salud Humana](#)  
[Energía](#)

*Su "Tienda de una sola Parada" para datos regionales, apoyo en Decisiones y Visualización.*

**Mesoamerica Hoy, Thursday, June 28, 2007**

**Ir al Visualizador de imágenes**  
Visualiza imágenes GOES de un país específico  
Construye tus propias animaciones GOES  
Última imagen GOES




28 Jun 2007  
16:45 UTC

**Videos de SERVIR**  
Pulsa sobre la imagen para ver el video.

First 21 Named Storms of 2005 Atlantic Hurricane Season



Una visión del futuro (18.2 MB)

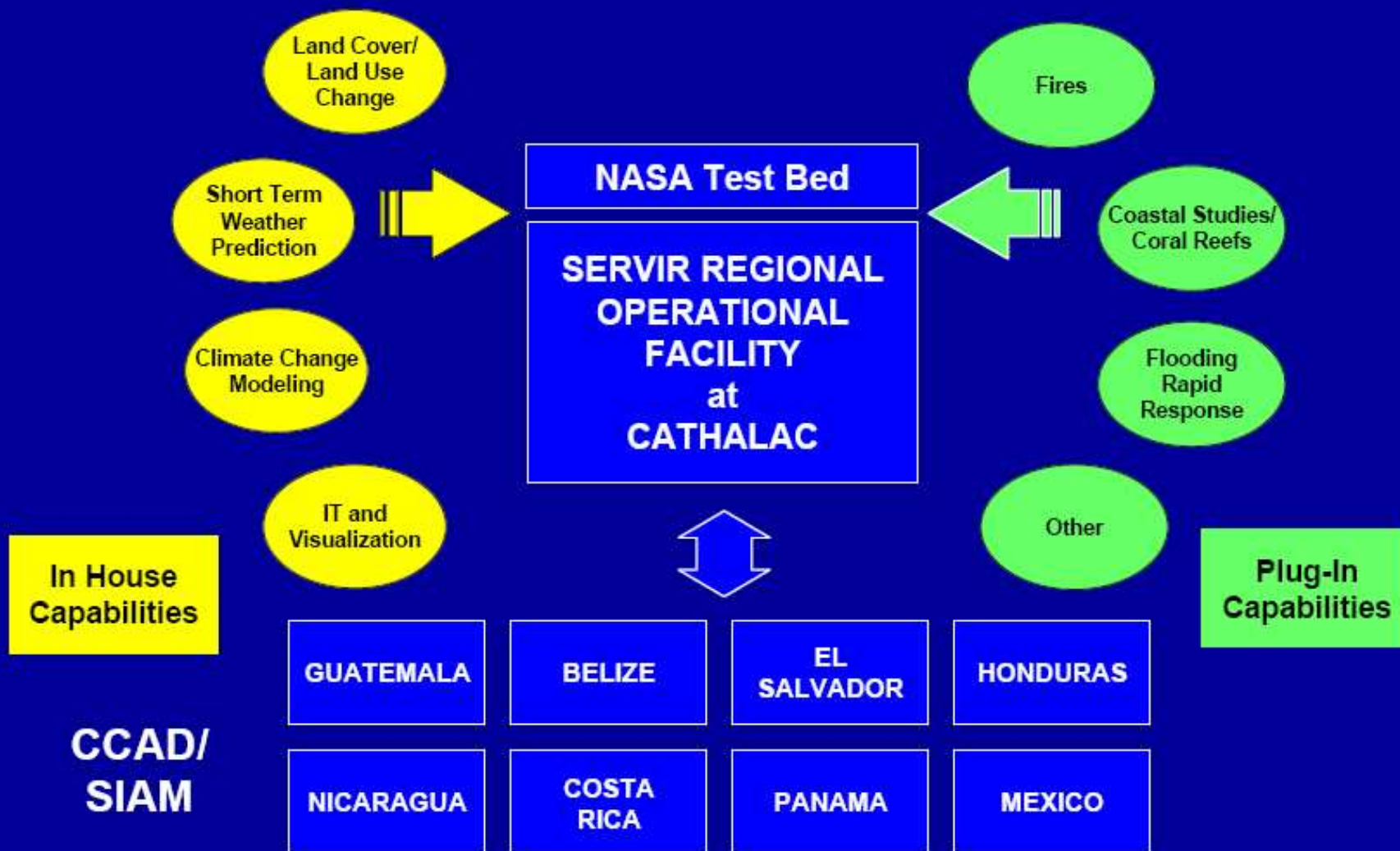


[NASA Earth Science Applications](#)



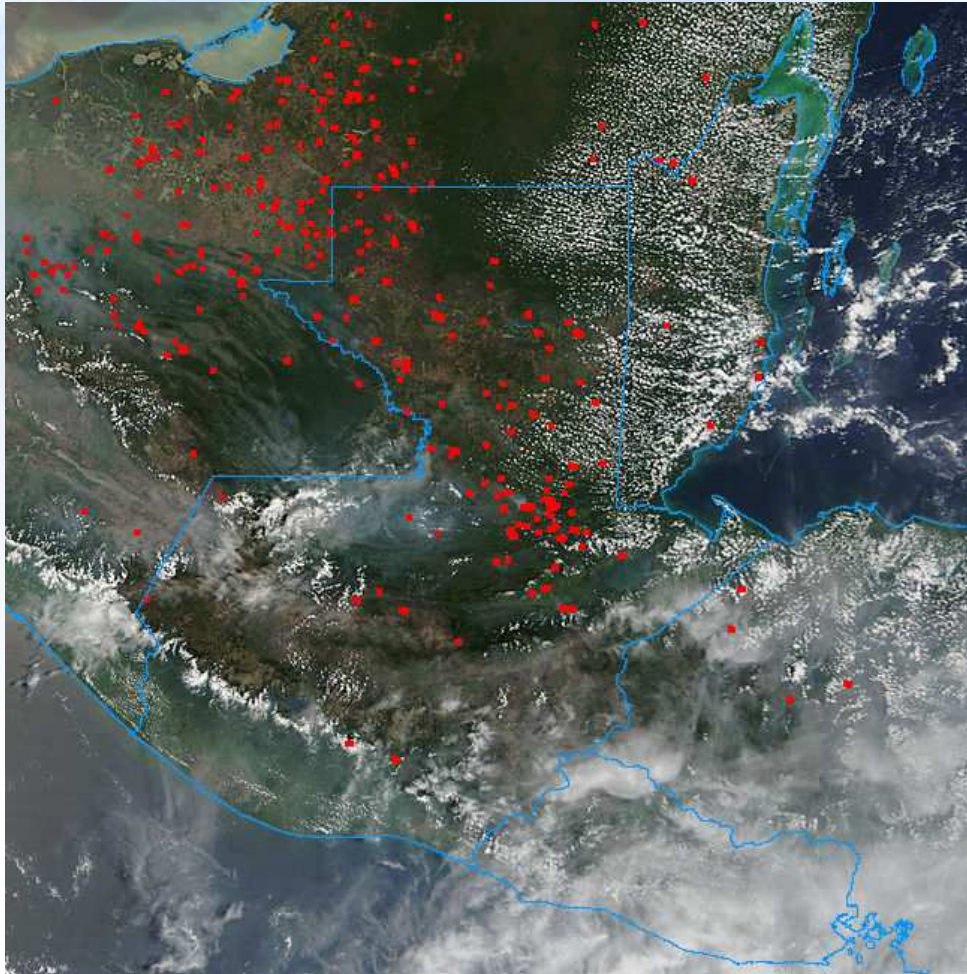


# ***SERVIR Framework***





# May 2007: Toxic Dust Cloud?



May 18, 2007: EPA's Office of International Affairs received an inquiry from their Central American colleagues about a "cloud" of air pollution over the region, particularly Costa Rica, Nicaragua, and Honduras.

The cloud was rumored to be contaminated sand & dust from the Sahara.

Could a SERVIR-Air approach help identify the source?

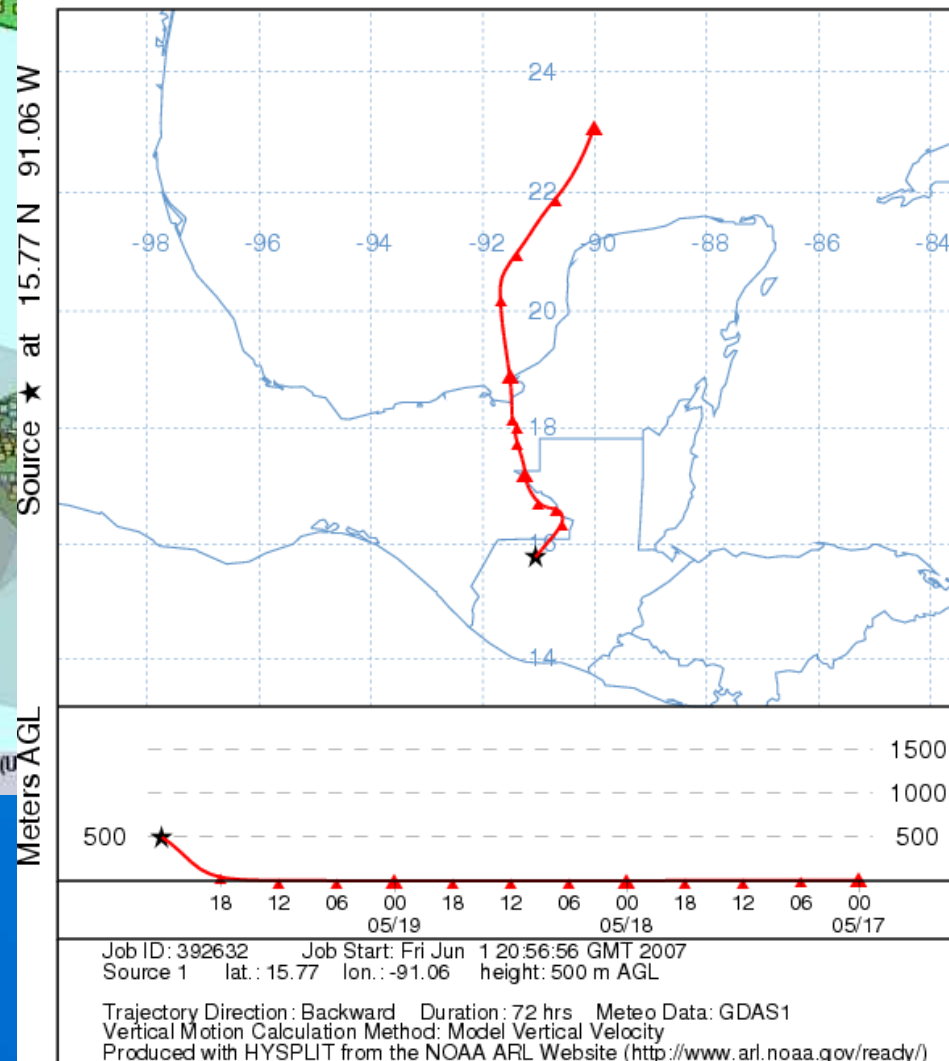


# NOAA Hazard Mapping System: *Indicated smoke on May 18-20*



## NOAA HYSPLIT: *Pointed to local sources*

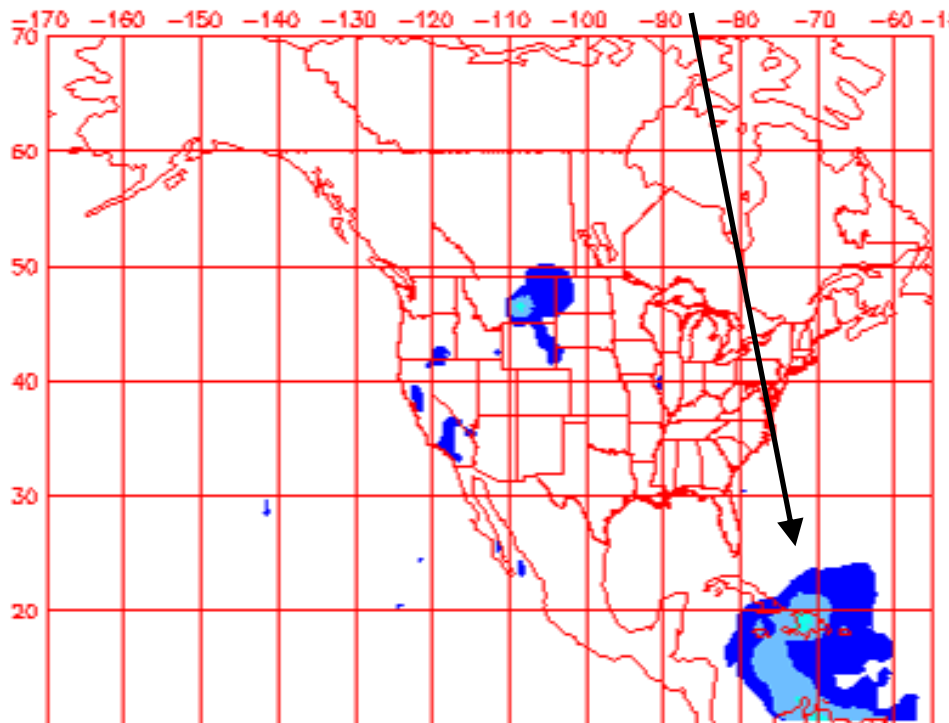
### NOAA HYSPLIT MODEL Backward trajectory ending at 00 UTC 20 May 07 GDAS Meteorological Data



# What about the rumors of Saharan dust?

NAAPS Surface Concentration ( $\mu\text{g}-\text{m}^{-3}$ )  
for 06:00Z 21 May 2007 Dust

Dust

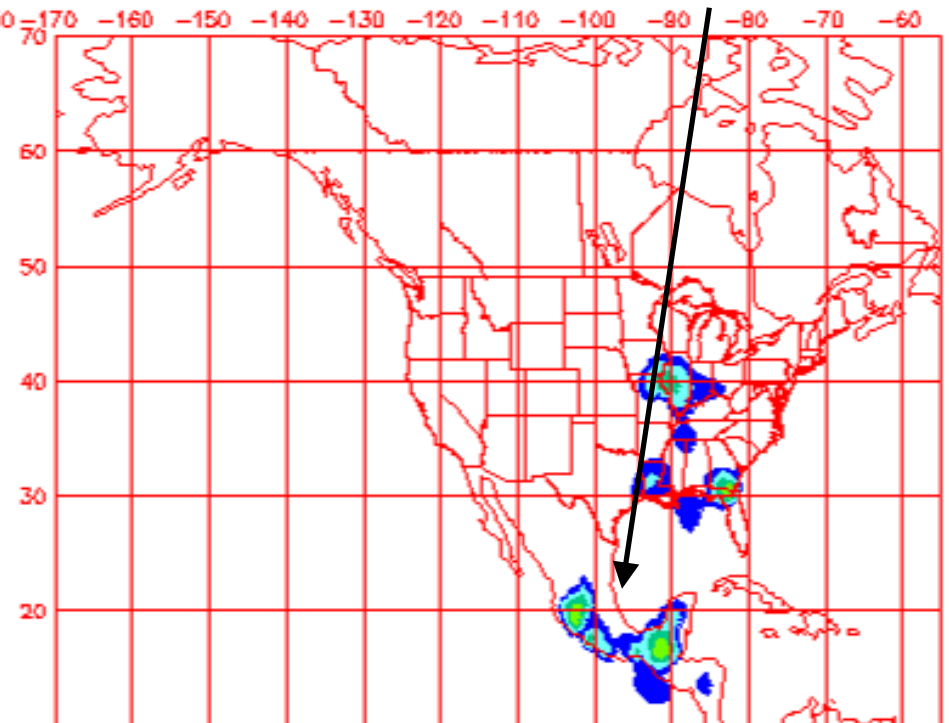


20. 40. 80. 160. 320. 640. 1280. 2560. 5120. 10240. 20480.

2.000E+01: 2.048E+04 [ 1.163E-25, 0.088E+01, 5.480E+00] MICRO- $\text{C}/\text{M}^3$

NAAPS Surface Concentration ( $\mu\text{g}-\text{m}^{-3}$ )  
for 06:00Z 21 May 2007 Smoke

Smoke



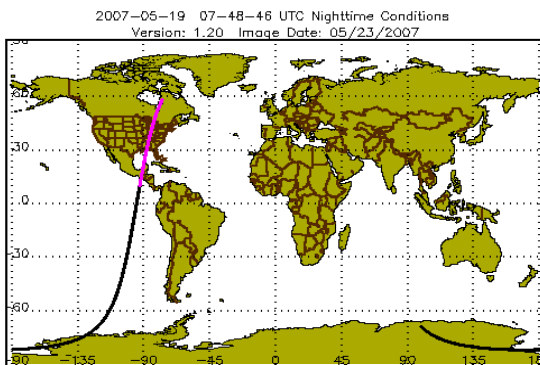
1. 2. 4. 8. 16. 32. 64. 128.

1.000E+00: 1.280E+02 [ 4.753E-20, 1.688E+01, 2.085E+01] MICRO- $\text{C}/\text{M}^3$   
20 May 2007 06:00Z 21 May 2007 06:00Z

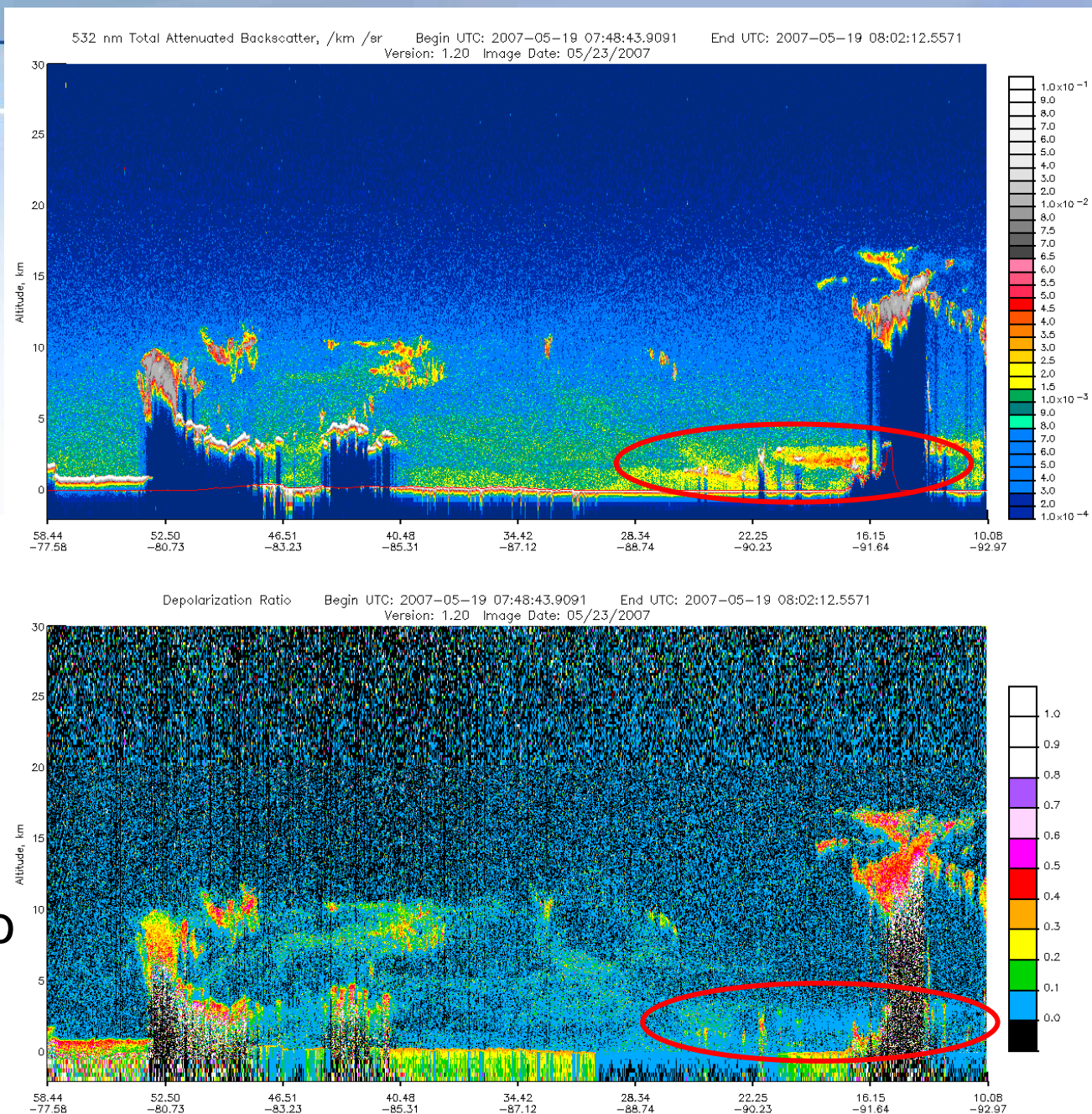
NRL model says there's smoke, and maybe dust to the east.



- CALIPSO images from May 18 over Costa Rica and Nicaragua



- Depolarization ratio supports case for smoke







# Mesoamerican SmogBlog

Microsoft PowerPoint - [SERVIR-Air for AQRS b.ppt]

Mesoamerican and Caribbean Air Quality - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://alg.umbc.edu/mac/

Most Visited 07q2hr.pdf (applicatio... TinyURL! Kathleen & David Wed... Google Maps /newsletter/ Metro - Trip Planner Remote Sensing Infor...

Gmail - Inbox (2622) - david... (385 unread) Yahoo! Mail, d... Air\_Quality\_NTO\_2006-092... GEO - Group on Earth Obse... Kevin Drum | Mother Jones Mesoamerican and Cari...

## Mesoamerican and Caribbean Air Quality

The MAC Smog Blog



### Elevados niveles de humo en parte de la región centroamericana y mexicana

By Wilfredo Urriola on April 15, 2009 15:27 Panama Time | [Permalink](#) | [TrackBacks \(0\)](#)

Los puntos de calor o incendios que se han registrado en los últimos días han generado altos niveles de humo en Nicaragua, Honduras, Guatemala y los estados mexicanos cercanos a este último (Chiapas, Tabasco, Campeche, Quintana Roo y Yucatán). La imagen del satélite polar Terra y su instrumento MODIS (imagen a la izquierda) nos muestra los puntos de calor generados y algunas columnas de humo, a pesar de la gran cantidad de nubes. El pronóstico de NAAPS mostrado con la animación a la derecha, nos permite visualizar el posible desplazamiento y los niveles del humo para estos últimos días de la semana.



Search

Search

About the Mesoamerican and Caribbean Air Quality Weblog

The Mesoamerican and Caribbean Air Quality weblog, also called "the MAC Smog Blog," is a diary of air quality for Mesoamerica and the Caribbean islands. Mesoamerica includes Guatemala, Belize, El Salvador, Honduras, Costa Rica, Panama, and the southern states of Mexico, while the major Caribbean islands include Cuba, Jamaica, Hispaniola (Haiti and Dominican Republic), Puerto Rico, the Leeward

Find: meso Next Previous Highlight all Match case

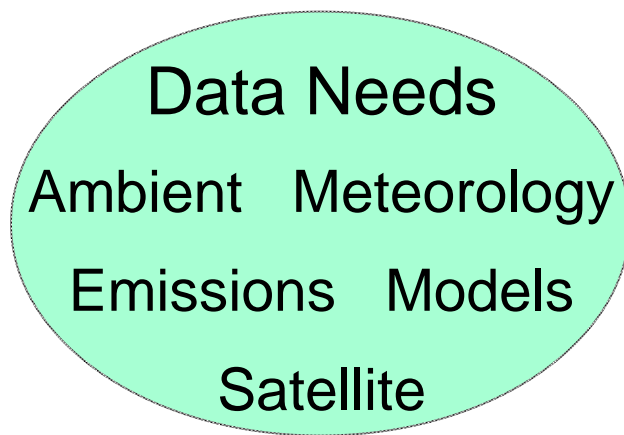
Done

10:51 PM  
Wednesday  
4/15/2009

# Community response to GEOSS: GEO Architecture Implementation Pilot

An open, best-effort collaboration to design and build GEOSS

- Air quality leadership
- Guided by a scenario describing the needed decision support, and the common upstream data they depend on
- Decisions need support from multiple types of data; no one type is adequate



Decision Makers

**Policy maker** assessing intercontinental transport

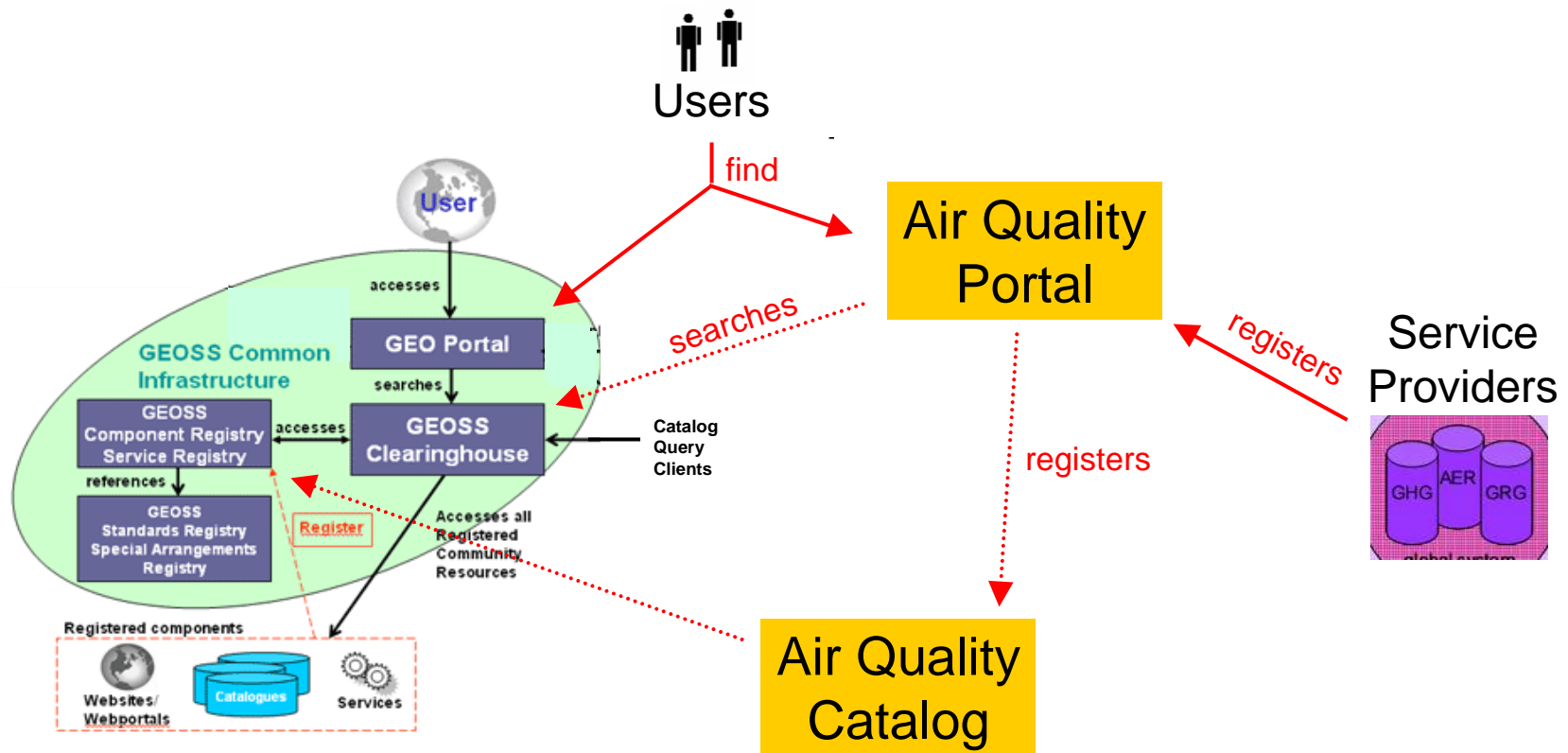
**AQ manager** assessing an exceptional event

**Public** planning activities today and tomorrow

# AIP Air Quality Output

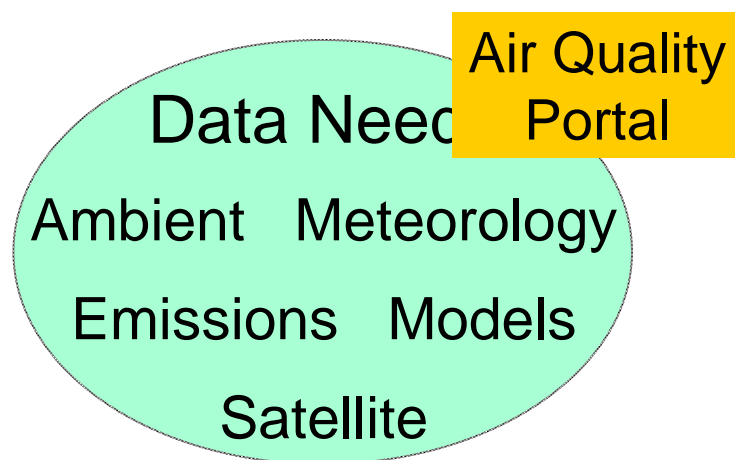
*AIP charge: produce 'persistent exemplars' to develop GEOSS*

The AIP AQ work group is building an AQ community infrastructure to compliment the GCI





# Where do we stand?



Decision Makers

**Policy maker** assessing intercontinental transport

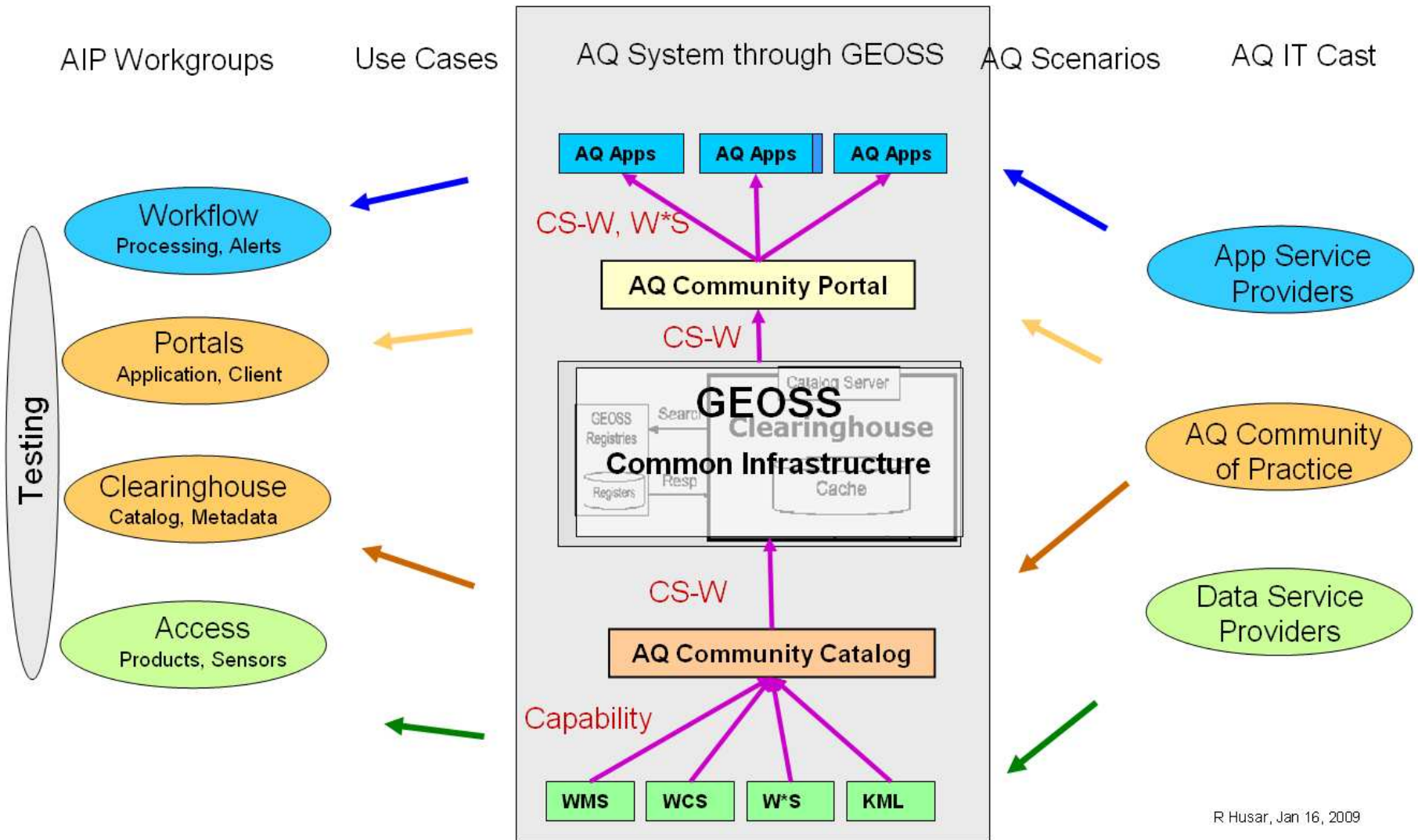
**AQ manager** assessing an exceptional event

**Public** planning activities today and tomorrow

❖ *Clearly a large gap remains...*



## AQ Workgroup (Human) Linkages in AIP-2



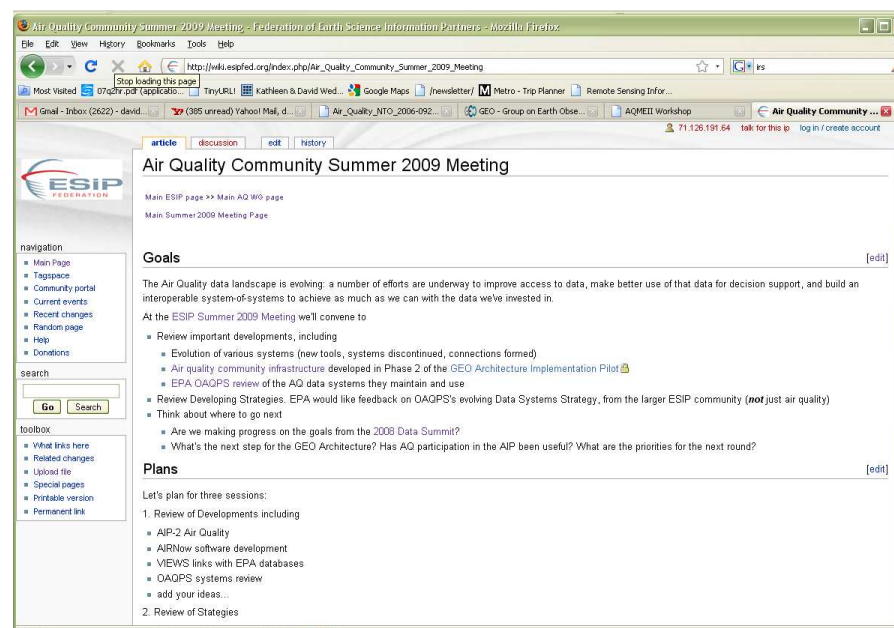
# Air Quality Community Meeting, Santa Barbara, July 8 & 9 2009

Meeting at the ESIP summer meeting; we will have 1.5 days of air quality sessions to:

- Review infrastructure developments
- Review evolving designs  
*OAQPS strategy, ...*
- Next steps...

In part, a follow-up to  
3/2008 OAQPS Data  
Summit

Please join us!



[http://wiki.esipfed.org/index.php/Air\\_Quality\\_Community\\_Summer\\_2009\\_Meeting](http://wiki.esipfed.org/index.php/Air_Quality_Community_Summer_2009_Meeting)

# GEO-VI Plenary, Washington DC, November 2009

The AQ Community is expected (and has planned) to demonstrate ***significant tangible results*** at a side event at the 2009 Plenary...

...including, but not limited to...

- AIRNow-International
- SERVIR-AIR
- AQ Community Infrastructure from AIP

❖ What else?

❖ How can we engage overseas (EU!!) colleagues?